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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/090,869 | 03/04/2002 | Scott E. Moore | 108298544US | 5296 |
| 25096 | 7590 | 09/09/2005 | EXAMINER | |
| PERKINS COIE LLP | | | ZHENG, LOIS L | |
| PATENT-SEA | | | ART UNIT | |
| P.O. BOX 1247 | | | PAPER NUMBER | |
| SEATTLE, WA 98111-1247 | | | 1742 | |

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/090,869

Applicant(s)

MOORE ET AL.

Examiner

Lois Zheng

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11 August 2005.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 6 June 2005 has been entered.

Status of Claims

2. Claims 1-42 are currently under examination.

Priority

3. Since the support for the instant independent claims, each by its entirety, are not provided in the parent application 09/651,779, the examiner concludes that the instant claims are only entitled to the priority date of 4 March 2002, which is the filing date of the instant application.

More specifically, the parent application 09/651,779 does not provide support for the workpiece electrode.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Numeral 112 as shown in Figure 3 is not mentioned in the specification.

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Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 6-8, 14, 21, 26-28 and 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emesh et al US 6,736,952 B2(Emesh) in view of Helmke US 3,239,439(Helmke).

Emesh teaches an electrochemical planarization apparatus comprising a workpiece carrier(Fig. 4 numeral 130) for carrying a wafer(Fig. 4 numeral 60), a polishing pad(Fig. 4 numeral 40) supported by a conductive platen(Fig. 4 numeral 50). The apparatus of Emesh further comprises conductive contact elements(Fig. 4 numeral

100) embedded in the polishing pad and in contact with the wafer substrate (Fig. 4). Fig. 8 of Emesh further teaches that the conductive platen can be separated into multiple concentric zones in order to provide different electric potential to different areas of the wafer(col. 11 lines 21-53). Emesh further teaches a process for electrochemically planarizing a workpiece.

Regarding instant claim 1, the workpiece carrier, conductive contact elements, the polishing pad and two concentric zones of the multi-zone conductive platen as taught by Emesh read on the claimed workpiece holder, workpiece electrode, mechanical medium, first and second remote electrodes respectively.

However, even though Emesh teaches that the power source used in the planarization process may supply a constant current or voltage or modulated current or voltage(col. 9 lines 49-54), Emesh does not positively recited separate AC and DC power supplies and a switching assembly coupled to the workpiece electrode and the remote electrodes.

Helmke teaches an electrodeposition apparatus comprising an AC power source (Figure, numeral 11), a DC power source(Figure, numeral 9) and a switch(Figure, numeral 13) allowing the current supply to be alternatively selected(col. 1 lines 46-51). Helmke further teach that this setup allows adherent electrodeposition(col. 1 lines 26-29).

Since an electrodeposition process is simply an electropolishing process operated with reverse polarity, one of ordinary skill in the art would have find it obvious to have incorporated the AC power source, the DC power source and the switch setup

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as taught by Helmke into the apparatus of Emesh in order to provide constant or modulated current or voltage as taught by Emesh with expected success. Therefore, the switching assembly as taught by Emesh in view of Helmke is inherently capable of selectively coupling the AC or DC power supply to the workpiece electrode and first and second remote electrodes as claimed.

Regarding instant claim 14, the instant claim is partially rejected for the same reason as stated in the rejection of instant claim 1 above. In addition, the first and second concentrically arranged conductive zones of the platen(i.e. first and second remote electrodes) as taught by Emesh in view of Helmke are juxtaposed to the workpiece holder as claimed.

Regarding instant claim 21, the instant claim is partially rejected for the same reason as stated in the rejection of instant claim 1 above. In addition, the conductive contact elements, and two concentric zones of the multi-zone conductive platen as taught by Emesh in view of Helmke read on the claimed first, second and third electrodes as claimed.

Regarding instant claims 6-7 and 26-27, Emesh further teaches that the conductive platen maybe moved in an orbital, linear or oscillatory pattern or any combination thereof in relative to the workpiece holder(col. 5 lines 25-30). Therefore, the multi-zone conductive platen as taught by Emesh in view of Helmke read on the movable electrode assembly carrying the first and second remote electrode and spaced apart from the workpiece holder as claimed.

Regarding instant claims 8 and 28, since Emesh in view of Helmke teaches a multi-zone conductive platen in order to apply different current potential to different areas of the workpiece, one of ordinary skill in the art would have also found the corresponding multi-zone concentric polishing pads obvious in order to allow optimization of the current potential to different areas of the workpiece as taught by Emesh. Therefore, each of the remote electrodes of Emesh in view of Helmke carries a corresponding polishing pad as claimed.

Regarding instant claim 35, the instant claim is rejected for the same reason as stated in the rejection of instant claim 1 above.

Regarding instant claim 36, the instant claim is partially rejected for the same reason as stated in the rejection of instant claim 1 above. In addition, the multi-zone conductive platen of Emesh in view of Helmke reads on the claimed electrode assembly that carries the first and second remote electrodes.

Regarding instant claim 37, the instant claim is partially rejected for the same reason as stated in the rejection of instant claim 35 above. In addition, Emesh further teaches that the conductive platen maybe moved in an orbital, linear or oscillatory pattern or any combination thereof in relative to the workpiece holder as claimed(col. 5 lines 25-30).

Regarding instant claims 38 and 39, the method as taught by Emesh includes contacting the process side of the workpiece with electrolyte through channels in the polishing pad and the conductive platen(Fig.4 numerals 110 and 210, col. 7 lines 20-22). Therefore, the first and second remote electrodes are in electrical communication

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with the electrolyte when coupled to a DC or an AC power source. In addition, since the apparatus of Emesh in view of Helmke is inherently capable of applying a direct current or an alternating current to the workpiece electrode, the first and the second remote electrodes, the claimed step of "contacting the processing side of the workpiece with a mechanical medium at least while applying the alternating current to the first and second remote electrodes" would have been within the scope of the teachings of Emesh in view of Helmke.

7. Claims 2-4, 9-13, 15-20, 22-25, 29-34 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emesh in view of Helmke, and further in view of Uzoh et al 5,911,619(Uzoh).

The teachings of Emesh and Helmke are discussed in paragraph 6 above.

Regarding instant claims 2 and 22, Emesh in view of Helmke does not teach that the workpiece electrode is carried by the workpiece holder.

Uzoh teaches an electrochemical planarization apparatus comprising a workpiece carrier(Fig. 7-8 numeral 66) carrying the workpiece(Fig. 8, character W) and workpiece electrodes(Fig.. 8 numeral 67) disposed within the workpiece carrier.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the workpiece electrodes into the workpiece carrier of Emesh in view of Helmke in the arrangement as taught by Uzoh in order to significantly reduce the probability of damage to the workpiece as taught by Uzoh(col. 3 lines 4-6).

Regarding instant claim 15, the instant claim is partially rejected for the same reason as stated in the rejection of instant claims 2 and 22 above. In addition, Emesh in

view of Helmke and Uzoh teach a polishing pad which reads on the claimed mechanical medium as recited in the instant invention.

Regarding instant claims 3, 16-18 and 23, Emesh further teaches that the conductive platen maybe moved in an orbital, linear or oscillatory pattern or any combination thereof in relative to the workpiece holder(col. 5 lines 25-30). Therefore, the multi-zone conductive platen as taught by Emesh in view of Helmke and Uzoh reads on the claimed electrode assembly carrying the first and second remote electrodes and positioned separately from the workpiece holder as claimed.

Regarding instant claims 4 and 24, Emesh further teaches the claimed workpiece holder with a substrate carrier having a chuck to hold the workpiece so that the processing side faces down and the claimed drive assembly couple to the workpiece carrier to move the workpiece(Fig. 4, col. 9 lines 54-56).

Regarding instant claims 9, 20 and 29, Emesh in view of Helmke do not explicitly teach the claimed table carrying the first and second remote electrodes. Uzoh teaches an table(Fig.7 numeral 62) carrying an electrode(Fig. 7 numeral 63). Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the table of Uzoh into the apparatus of Emesh in view of Helmke in order to provide proper support to the first and second remote electrodes.

Regarding instant claim 19, the instant claim is rejected in light of the teachings of Emesh in view of Helmke and Uzoh for the same reason as stated in the rejection of instant claims 8 and 28 above.

Regarding instant claim 40, the instant claim is partially rejected for the same reasons as stated in the rejection of instant claims 38-39 above. In addition, the apparatus of Emesh in view of Helmke and Uzoh can produce different types of wave forms, for example, the triangular sawtooth shaped waveform as shown in Fig. 14(c) of Uzoh, which requires superimposing a DC current with an AC current. Therefore, the apparatus of Emesh in view of Helmke and Uzoh teach the claimed step of applying an alternating current to the first and second remote electrodes while applying the direct current as recited in instant claim 40.

Regarding instant claim 41, the instant claim is partially rejected for the same reason as stated in the rejection of instant claim 40 above. In addition, the multi-zone conductive platen of Emesh in view of Helmke and Uzoh can be moved in an orbital, linear or oscillatory pattern or any combination thereof, the apparatus of Emesh in view of Helmke and Uzoh is inherently capable of moving the first and second remote electrodes to have a higher dwell time at one region of the workpiece than another as recited in the instant claim.

Regarding instant claim 42, the instant claim is partially rejected for the same reason as stated in the rejection of instant claim 40 above. In addition, the multi-zone conductive platen of Emesh in view of Helmke and Uzoh can be moved in an orbital, linear or oscillatory pattern or any combination thereof, the claimed step of moving the first and second remote electrodes to have a higher dwell time at a region of the workpiece having a thicker plating layer as recited in the instant claim would have been within the scope of the teachings of Emesh in view of Helmke and Uzoh.

Regarding instant claims 10-13 and 30-34, Emesh in view of Helmke do not explicitly teach that the planarization apparatus further comprising a computer operable medium containing instructions to operate the apparatus.

Uzoh further teaches that a controller having a CPU, Memory, Buses, I/O ports with software instructions and data stored in the Memory for controlling the current(col. 5 lines 22-31). Fig. 14 of Uzoh further teaches a plurality of current waveforms produced by the computer controller.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the computer controller with software instructions as taught by Uzoh into the planarization apparatus of Emesh in view of Helmke in order to optimize the relative magnitudes of planarization effects as taught by Uzoh(col. 5 lines 16-21).

Therefore, computer controller equipped planarization apparatus of Emesh in view of Helmke and Uzoh is inherently capable of operating the apparatus according to the processes as recited in the instant claims 10-13 and 30-34.

8. Claims 5 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emesh in view of Helmke and Uzoh, and further in view of Dordi et al US 6,416,647(Dordi)

The teachings of Emesh and Helmke are discussed in paragraph 6 above. The teachings of Uzoh are discussed in paragraph 7 above. However, Emesh in view of Helmke and Uzoh do not explicitly teach that the workpiece is held with its processing side facing upward.

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Dordi teaches an electrochemical planarization apparatus comprising an upward facing workpiece(title, abstract).

Therefore, it would have been obvious to one of ordinary skill in the art to have re-arranged parts of the planarization apparatus of Emesh in view of Helmke and Uzoh to provide an apparatus with the workpiece processing side facing upward as taught by Dordi in order to eliminate the need for additional devices for transferring and flipping the workpiece for processing, thereby, allowing fast substrate processing and increase throughput as taught by Dordi(col. 2 line 59 – col. 3 line 13).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WZ
Sept 1, 2005

George Wyszomierski
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PRIMARY EXAMINER
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